NOTES BY THE EDITOR.

PROF. MARK W. HARRINGTON.

The observers and friends of the Weather Bureau will not soon forget that before Professor Harrington was appointed Chief of the Weather Bureau he had devoted his energies and fortune to the maintenance of the American Meteorological Journal and to the awakening of a general interest in meteorology as a course of instruction in colleges and universities. Among all the sciences that have important practical bearings, there is none in which the need of popular education is more severely felt. In most branches of science a few experts do the observing and investigating, but meteorology has for ages largely relied upon the work of amateurs and voluntary observers, whose daily occupation as navigators, farmers, physicists, and surveyors, etc., leave them but little opportunity to pursue any consecutive train of thought on the subject. The study of meteorology and climatology in schools and colleges will not only bring to us a high class of observers, but will benefit the individual no matter what his occupation in life, by giving him a truer insight into the operations of nature.

From this point of view, we are pleased to learn that Professor Harrington may prepare for publication an introduction to physical geography, and is ready at any time to deliver those courses of lectures on this subject, for which he has always been so famous.

OCEAN TEMPERATURES AND METEOROLOGY.

The Geographical Journal for August, 1898, published by the Royal Geographical Society of London contains an important paper by Sir John Murray, the well-known editor of the "Results of the Challenger Expedition." Dr. Murray has collected the data and published a chart showing the annual range of temperature in the surface waters of the ocean and its relation to other oceanographical phenomena. The chart takes account, not of the mean monthly temperatures and the average range from the mean of the midsummer to the mean of the midwinter temperatures but of the so-called absolute annual range or the difference between the absolute extremes of temperature. The surface temperature of ocean water is usually obtained by dipping a thermometer into a freshly drawn bucket of water. The observed temperature, therefore, relates to some indefinite depth which, owing to the disturbance of the water in the neighborhood of the ship, and especially the disturbance due to the wind and waves, may be anywhere from 1 to 5 feet below the precise surface of the water. The ocean temperatures thus obtained, should, from a physicist's point of view, be compared with continental temperatures taken at a short distance, say 3 inches below the surface of the ground. If we wish to compare the temperature of the actual surface of the soil with that of the actual surface of the water, we shall need a special arrangement and a quiet water. We shall not go far wrong in assuming that the temperatures charted by Dr. Murray are essentially the same as those of the lowest stratum of air at the surface of the ocean, but if we wish to compare these with the temperature of the air at the surface of the land on the adjoining continents we find a difficulty, owing to the fact that few, if any, stations keep a record of temperatures at the surface of the soil or of the air close to the soil. A chart of maximum or minimum air temperatures made up from ordinary meteorological data would give annual ranges considerably lower than would be given by thermometers placed on the soil and, therefore, not precisely comparable with those charted by Dr. Murray.

There are, however, many questions important to meteorology upon which this chart throws no uncertain light. The greatest annual range, exceeding 50° F., occurs over a small portion of the Japan Sea and over a larger portion of the Atlantic Ocean east of Cape Cod. The greatest recorded local range according to Dr. Murray's text is 52.7°, viz, from 28.8° F. to 81.5° F. The lowest of all the temperatures at the surface is 26° F. in the north Atlantic east of Nova Scotia, and the highest is 90° F. in the tropical Pacific and 96° F. in the Red Sea and Persian Gulf, whence the greatest general range of ocean temperature for the whole world is 70° F.

These latter figures may be compared with the temperatures on dry land. Thus, for instance, the locality that has the absolutely largest range of temperature would seem to be the station Verkojansk, in Siberia, where the lowest temperature of —93.6° F. was observed in February, 1893, and the lowest monthly mean was about —67° F., whereas the highest temperature was 101.8° F., giving an extreme absolute local range of 195.4° F. The range of temperature between the mean of the coldest month and the mean of the warmest month at this place is 120° F. If we seek for the greatest general range of air temperature over the whole globe we should probably have to compare Verkojansk with some such station as Yuma, Ariz., where the extreme highest temperature is recorded as about 120° F., and the average warmest month was about 95° F., thus giving a general range of air temperature for the whole globe of 213.6° F., and about 162° F. for the range of monthly means.

The large annual ranges of temperature of the ocean surface, viz, 25° or more in the North Atlantic and North Pacific, represent the influence of the cold northwest winds blowing off shore in the winter as contrasted with the warm southerly winds blowing on or along shore in summer. The regions of large range are, therefore, confined to the western portions of the oceans and the eastern shores of the continents. At first thought one would expect to find in Dr. Murray's lines of equal annual temperature range some traces of the course of the Gulf Stream and Kuroshiwo, but it is only the changes in the positions of these currents that can produce ranges of temperature, and these changes are so largely controlled by the wind that Dr. Murray's charts show us principally the effect upon the ocean water of the changes in the atmospheric circulation. This same principle applies also to the closed seas, such as the Mediterranean and Baltic, the Red Sea, and the Persian Gulf, in all which cases a larger range of temperature is observed at the head of the sea than at the mouth of the sea, due to the fact that the highest temperatures occur at the head when the wind blows toward that direction in the summer, and the lowest temperatures when the wind blows in the opposite direction at the opposite season of the year. There is, therefore, in this map no comfort for those who maintain that the Gulf Stream or the Kuroshiwo, respectively, alleviate or control the temperatures of the eastern portion of the Atlantic and Pacific oceans, and the adjacent portions of Europe and America, respectively. Everywhere we see that it is the wind that controls the temperature of the surface of the ocean, and then carries this ocean temperature inward over the land. The same remarks apply to the Southern Hemisphere, where Dr. Murray's chart shows that the greatest range of ocean temperatures is in the regions where there is the greatest annual range of wind direction.